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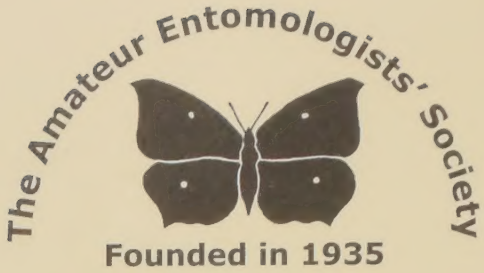

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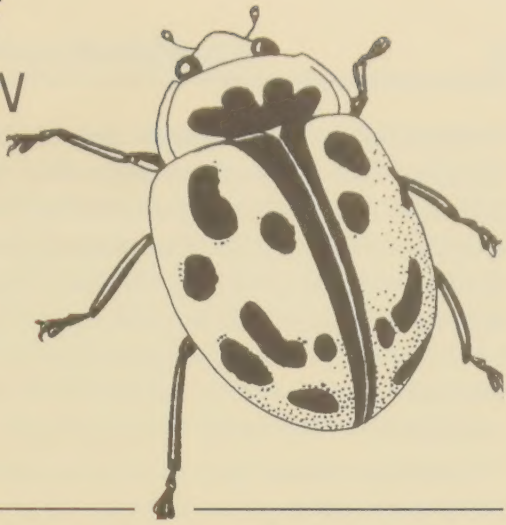

No. 75, March 2015

EDITORIAL

From now on, we intend to publish *ICN* on a quarterly basis, providing about the same total number of pages as in 2014, when we produced two relatively large issues, and in many previous years, when it appeared every four months.

This issue of *ICN* mentions the arrest, in Thailand, of four European entomologists on charges of collecting in a national reserve without the necessary permits. Their case resembles one in India a few years ago, where two Czech entomologists were prosecuted for collecting beetles in a National Park. In both cases, the individuals concerned appear to have been under the impression that they were acting lawfully. Naturalists and scientists might therefore have some concern about visiting countries where they lack familiarity with wildlife laws and with the manner in which such laws are enforced.

It is understandable that many governments around the world should wish to prevent unsustainable commercial exploitation of their wildlife, especially in areas designated for protection. In principle, species assessed as being significantly at risk from collectors could be legally protected on a selective basis. In practice, however, a blanket ban on collecting might be perceived as the easy (perhaps the only) solution, especially where enforcement officers lack species-identification skills. Even in the UK, where statutory protection of invertebrate species is highly selective, there are blanket bans on unlicensed collecting in particular areas, such as sites variously designated for conservation. It would therefore probably be unfair to criticise other countries that have ostensibly similar anti-collecting laws in specified areas.

Quite apart from species-conservation, governments of developing countries have become concerned about the potential 'plunder' of biological resources that could make a profit for pharmaceutical and biotechnology companies. Their concern has perhaps contributed to the apparent increase in the enactment of blanket bans on collecting. Irrespective of the inherent rights and wrongs of anti-collecting laws, there is reason to fear that they have a deterrent effect on entomologists and others whose fieldwork could otherwise provide data of conservation value. Such laws might even deter young people from taking up the study of invertebrates in the first place.

On a more sinister note, it is conceivable that draconian bans on collecting are a useful strategy on the part of governments that fail adequately to protect their natural resources. Perhaps they are only too happy to suppose that relatively few naturalists or scientists will be prepared to take the time and trouble (and to take risks of falling foul of the law) in order to record invertebrates and thus to discover what is at stake and what is being destroyed.

NEWS, VIEWS AND GENERAL INFORMATION

Biodiversity in England: government policy and strategy

When the UK's present coalition government took office in May 2010, its leader David Cameron said that he wanted it to be the 'greenest government ever'. This was a bold aspiration, given that, in order to help reduce the government's financial deficit, he was simultaneously planning cutbacks for government agencies that oversee the protection of the environment. Also, there was a presumption, apparently evidence-based, that 'green government' was compatible with the ever-increasing economic growth that the government saw as an essential remedy for the nation's economic woes.

Over the following years, the UK government has often been criticised for failing to live up to David Cameron's green aspiration, with regard both to policy and performance. For example, a plan to sell nationally owned forests

was criticised so vociferously that it had to be abandoned. According to recent press reports, the same might quietly be happening to a proposed policy for biodiversity offsetting, whereby biologically damaging development of sites (including ancient woodlands) would be permitted in return for 'new habitats' being created elsewhere (see *ICN* 72). On the other hand, the government successfully established a new policy for urban and industrial development, now known as the National Policy Planning Framework. This enforces a presumption in favour of development, subject to certain restrictions where there are pre-existing and officially approved provisions for site protection.

With regard to performance, there is evidence that the state of the UK's biodiversity has deteriorated in many respects. The latest government biodiversity statistics for England are set out in a report entitled *Biodiversity 2020: a strategy for England's wildlife and ecosystem services*. Published in December 2014 by Defra (Department for Environment and Rural Affairs), the report provides assessments of 'short-term' and 'long-term' changes in various indicators of biodiversity or of provision for biodiversity. The changes are categorised as 'improvement', 'deterioration' or 'no change'. There are 24 indicators listed but some of them are data-deficient or are not yet being assessed. For example, assessment of 'habitat connectivity in the wider countryside' remains undeveloped.

In the short term (mostly over recent five-year periods), several of the indicators seem to show improvement. These include (a) the extent of marine protected areas, (b) the status of 'species of European importance', (c) marine biodiversity and ecosystem services, (d) native cattle breeds, (e) plant genetic resources and (f) targeted agri-environment schemes. An absence of short-term change is shown for several indicators, including (g) the extent of terrestrial protected areas, (h) the abundance of 'priority species' and (i) populations of farmland bats, (j) woodland birds and (k) woodland butterflies in the wider countryside. Decline in the short term is shown for (l) the 'favourable condition status' of Sites of Special Scientific Interest, (m) the status of habitats (as opposed to species) of European importance, (n) populations of breeding farmland birds, (o) wetland birds and (p) farmland butterfly species in the 'wider countryside', (q) conservation volunteering and (r) funding for biodiversity conservation.

The report also shows data over longer periods, starting before 2007 or 2009. Comparison of these data with the short-term data provides an indication as to whether trends have changed in recent years. There was, for example, an evident halt in the provision of terrestrial protected areas

after 2009. On the other hand, the status of priority species appears to have stabilised between 2007 and 2012, having previously deteriorated since at least 1970. Also, the size of fish in the North Sea began to increase between 2006 and 2011, following many years of decrease.

Many caveats come with the presentation of data purporting to show trends over periods of years. For example, species-status data are difficult to interpret where lists of designated species have been amended over the years. Also, with regard to invertebrate taxa other than Priority Species, the report shows data only for butterflies, which represent an extremely small proportion of invertebrate biodiversity. The indicator for Priority Species includes moths, as well as butterflies, but no other invertebrate taxa. Invertebrates are not considered at all in certain indicators that, by definition, ought to include them. For example, there is an indicator called 'species in the wider marine environment', which refers only to seabirds. There is another indicator called 'biodiversity and ecosystem services: species', which includes pollinating insects. It is, however, entirely data-deficient.

For Priority Species, the data analysis is based on 213 species, for which there are robust data-sets. These comprise 101 birds, 21 butterflies, 79 moths and 12 mammals. The abundance of these species shows a decline of more than 60% over the period 1970 to 2010. Although the report is intended to cover England only, these data are UK-based and cannot be nationally separated.

Since invertebrates represent a great proportion of overall biodiversity, their poor coverage casts doubt on the value of the report as an overall indicator. In any case, the overall assessment is not very encouraging. For example, the 24 indicators include a total of 48 individual measures, of which twelve (25%) show an improvement in the short term. A further 25% show little or no overall short-term change, while seven (15%) show deterioration. The rest are data-deficient or not assessed.

Arrest of European insect collectors in Thailand

Last October, the *Chang Mai City News* reported that four European scientists had been arrested for collecting insects in the Doi Pha Hom Pok National Park, in the Mae Ai district of Chang Mai, Thailand. It appeared that military officials had granted permission for these entomologists to collect specimens but that forestry officials and the Thai police had later not accepted this permission as valid. The report states that the police seized more than 1,000

butterflies and moths, as well as several reptile specimens and various species of beetle and other insects, together with equipment.

Under Thai law, the collection of animals is forbidden in conservation parks unless, exceptionally, the Director General of the Royal Forest Department grants an exemption for scientific study.

The press report stated that the four men had later been released from custody pending a bail application but that their passports had been confiscated. The *ICN* editor has not been able to find any later reports of the case. The individuals concerned are Dr. Thomas Ihle, 40, originally from Halle in Germany, Dr. Karel Cerný, 62, from Innsbruck in Austria, Dr. Zdenek Weidenhoffer, 76, and Bohumil Vodrlind, 60, the latter both from the Czech Republic.

Dr. Ihle is a freelance entomologist and zoologist and has lived in Thailand since 1999 as a freelance research worker and expedition leader, concentrating on south-east Asian butterflies. He works with various museums such as the Museum of Natural History, Erfurt, the Museum Koenig in Bonn, the Museum Witt in Munich and the Entomological Museum of Dr. Ulf Eitschberger.

Dr. Karel Cerný works with the Museum Witt in Munich as an accredited expert in ecology and entomology of the Arctiidae and is co-author of *Moths of Thailand. Volume Six: Arctiidae*, published by St. Gabriel, Bangkok.

Dr. Zdenek Weidenhoffer is a member of the Czech Society for Butterfly and Moth Conservation and is the co-author of *Butterflies of the Palaearctic Region, Volume Three: Lycaenidae*, published by Omnes Artes, Milan. He is also a co-editor of *Butterflies of the Czech Republic: Distribution and Conservation.*

Bohumil Vodrlind is also a member of the Czech Society for Butterfly and Moth Conservation and has contributed to *Faunistic records from the Czech Republic*.

This story resembles that of two Czech entomologists, Dr. Petr Švácha (Senior Scientist at the Institute of Entomology, Academy of Sciences of the Czech Republic) and his companion Emil Kučera, a Czech forest official (see *ICN* 57, October 2008). They were arrested near Darjeeling, West Bengal, India for allegedly collecting invertebrates without a permit in Singalila National Park. They argued that they had not been in the Park while collecting but Dr. Švácha was found guilty and fined the equivalent of 240 pounds sterling. The outcome was far worse for Mr Kučera, who was sentenced to three years in jail, subject to appeal, and fined the equivalent of 720 pounds sterling.

There is an Invertebrate Link policy statement (Anon. 2008) on laws to protect species. The statement provides a rational basis for selecting species for legal protection.

Reference

Anon. 2008. Invertebrate link (JCCBI): Statement on the appropriate role of legislation in controlling activities likely to harm specified taxa of terrestrial and freshwater invertebrates, with particular reference to taking and killing. *British Journal of Entomology and Natural History* **21**: 202-04.

SITES AND SPECIES OF INTEREST

Brown Hairstreak butterfly on military land in Wiltshire, Southern England

The 2014 edition of the Ministry of Defence (MoD) magazine *Sanctuary* includes a report on the conservation of the Brown Hairstreak *Thecla betulae* on military land in south-east Wiltshire. Although its foodplant, Blackthorn *Prunus spinosa* is common, its British populations are estimated to have declined by over 40% since the 1970s and it is classed as a UK Biodiversity Action Plan species. It is particularly vulnerable to the unfavourable management and removal of hedgerows but there is evidence that it has begun to flourish again in some southern counties of England in the last few years. These include Wiltshire, where there are two principal populations: Braydon Forest west of Swindon and on the Hampshire border around Shipton Bellinger on MoD land.

The *Sanctuary* article includes a map, showing an impressive expansion in the distribution of the butterfly from the Hampshire border westwards across Salisbury Plain, which contains one of the largest military training areas in the UK. The Plain is known especially for its grassland biotope, which is the most extensive of its kind still remaining in north-west Europe. There are,

however, many areas of Blackthorn thicket and scrub, which partly date back to the decline in the rabbit population in the 1960s, following myxomatosis.

Following the designation of the Plain as a Special Area of Conservation under European law, together with previous designations of Sites of Special Scientific Interest, various ecological studies and management plans have been implemented in order to meet conservation objectives, while reconciling the latter with military and agricultural requirements. Although there is no general shortage of Blackthorn, certain areas of the scrub are managed in rotation in order to maintain good habitat for specialists such as the Brown Hairstreak and the Nightingale *Luscinia megarhynchos*, now a very localised bird in Britain. Also, Blackthorn thickets are being maintained within the main garrisons on the Plain, where the Brown Hairstreak has also been found in recent years.

Re-discovery of globally rare crane fly *Gnophomyia elsneri*

Buglife - The Invertebrate Conservation Trust, has reported the re-discovery of an extremely rare crane fly *Gnophomyia elsneri*, known colloquially as the Royal Splinter Crane fly, which had not been seen anywhere since 1986. A male was found by Alan Stubbs and Dr. Sarah Henshall at High Standing Hill, Windsor, England, one of the two locations in the world where the species was previously recorded. The other site was in Slovakia where the fly was found in a light trap.

The available evidence indicates that *Gnophomyia elsneri* depends on wet wood mould in decaying Beech *Fagus sylvatica* trees, a rare habitat that can be provided only by successive generations of trees that are allowed to grow old and become 'veterans'. This is the management policy at Windsor, which is a key site for invertebrates associated with ancient trees and wood pasture.

RESEARCH NOTES

'Invasional meltdown' predicted for Britain's freshwater ecosystems

As mentioned in previous issues of *ICN*, the so-called 'killer shrimps' *Dikerogammarus villosus* and *D. haemobaphes* have become established in Great Britain in recent years. According to the latest desk study, their introduction is merely the tip of an ecological iceberg (Gallardo & Aldridge, 2015). The authors go as far as to say that Britain's freshwater ecosystems are on the brink of an 'invasional meltdown', which is a term denoting a synergistic interaction between invading species, favouring an increase in the number of such species and leading to a decline in the richness and abundance of native species. The authors reviewed the literature on 23 freshwater species from south-east Europe, in order to predict their capacity to interact in ways that would enable some to 'pave the way for others'. The 23 species, including shrimps, worms and fish from south-east Europe, were selected on the basis of being regarded as high risk as invaders. Five of them, including the two shrimps named above, are already found in Britain.

The prediction of positive or neutral interactions between many of the 23 species is based on their common geographical origin; i.e. the Ponto-Caspian region. The authors hypothesise that, as a result of co-evolution, they are generally more likely to provide ecological support to each other, rather than to wipe each other out. The authors' literature review showed evidence of this, where one species helps to provide food or habitat-structure for another.

The authors examined likely routes of invasion, noting that 14 of the 23 species were already established in the Rhine estuary and in Dutch ports, from which freshwater invasive species can easily be imported into Britain. The authors also identified parts of Britain that would provide the most suitable conditions for the establishment of the species concerned. Taking account also of transportation routes, they assess the south-east of England as being at the highest risk of invasion, with risk declining further north and west.

From the above findings, the authors conclude that Britain's freshwater ecosystems are at high risk of an 'invasional meltdown'. They recommend that the methods in this study be used to help to set priorities and aid decision-making in Britain and in other countries. They point out that biosecurity ought to be improved by focussing on pathways of invasion rather than on individual species, in order to intercept a number of invaders systematically. Also, there is a fundamental need for good international communication regarding the status and impacts of invasive species.

Meanwhile, there has been renewed concern in Britain about the Chinese Mitten Crab *Eriocheir sinensis*, which is said to be amongst the world's worst 100 invasive species, partly owing to its severe impact on commercial fisheries but also because it damages habitats by burrowing into banks, preying on other species and competing with them for food. Also, in Asia but not in Europe, it is an intermediate host of a fluke that can cause serious illness in humans and other mammals. A native of east Asia, it has been established in brackish and freshwater habitats across much of Europe and has become abundant in some areas, particularly in north Germany where it first appeared over a hundred years ago. It was first recorded in Britain in 1935 and has become established in the Rivers Thames, Medway and Ouse and recorded from several sites throughout England and Wales.

Reference

Gallardo, B. & Aldridge, D. C., 2015. Great Britain heading for a Ponto-Caspian invasional meltdown? *Journal of Applied Ecology* **52**: 41-49.

Light pollution

Effects of light pollution on invertebrates were reviewed thoroughly a few years ago by Bruce-White & Shardlow (2011). Some of these are more subtle than the obvious attraction of insects to artificial light, which can lead to mortality from behavioural disturbance and increased exposure to predators. For example, Bruce-White and Shardlow (*op. cit.*) cited evidence showing that artificial light can prevent the normal onset of diapause in response to changing day length (photoperiod). This was based on research involving larvae of the European Corn Borer *Ostrinia nubilalis* and of the Codling moth *Cydia pomonella*.

Diapause is essential for the survival of many species, since their uninterrupted development would expose them to unfavourable seasonal conditions which they could not survive. Bruce-White and Shardlow (*op. cit.*) pointed out that inhibition of diapause can therefore affect invertebrate populations significantly and could even cause local extinction quite quickly.

Recent research in the Netherlands has provided further evidence that artificial light, depending on the spectral range, can severely disrupt invertebrate life cycles. A research team at Wageningen University experimentally subjected Cabbage moth *Mamestra brassicae* caterpillars to low-intensity green, white or red light at night and determined their growth rate, maximum larval body mass, age at pupation, pupal body mass and duration of pupation. They found that, after night-time exposure to green or white light, male caterpillars pupated earlier and at a smaller body mass than if they were exposed to red light or left in darkness as a control. No such effects were found in female caterpillars.

The Dutch team also found evidence of inhibition of pupal diapause in both the male and female moths that had been exposed to white or green light overnight in the caterpillar stage. About 85% of them emerged as adults by the time of emergence of the first adult in the dark control treatment (i.e. 110 days after pupation). Since night-time exposure to red light did not appear to disrupt the life cycle of the moth, the authors suggest that outdoor lighting could be selected in order to mitigate the harmful effects of artificial light.

At the Cornwall Campus of Exeter University in the UK, a group led by Dr. Tom Davies has been looking at the effects of light pollution on a broader front. In research conducted at Helston, Cornwall, they used pitfall traps to sample populations of ground-dwelling invertebrates on grassy areas beneath high pressure sodium street lights at two different lighting intensities (Davies *et al.*, 2012). The results, covering a total of 1,194 individual invertebrates representing 60 taxa, showed that ground beetles, harvestmen, ants, woodlice and amphipods were all more abundant in close proximity to the lights, thus adding to the proportion of predatory and scavenging individuals in the community, as compared with unlit communities. By counting invertebrates by both day and night, it was found that this perturbation of community composition was persistent and not a result of nocturnal migration towards the lit areas.

The Helston study is said to provide the first evidence of a radical alteration of invertebrate community composition as a result of light pollution. The research group argues that there could be effects further up the food chain,

affecting predatory birds and mammals and perhaps even humans. Research on light pollution is also being undertaken by Andy Wakefield at Bristol University.

In the UK, the local authorities, which have responsibility for street lighting, are guided by the National Planning Policy Framework. This mentions light pollution in relation to wildlife but the local authorities are more concerned with other considerations, including energy efficiency and the effects of stray light on adjacent houses. In any case, it seems unlikely that many people would, for example, favour red street lighting. Indeed, the very narrow-spectrum orange light of low-pressure sodium is now increasingly being replaced by various forms of white lighting. There is, however, scope for choosing light sources and lamp designs that, according to current knowledge, are thought to be the least damaging. A very informative guide on light sources is available online from the Bat Conservation Trust and the Institution of Lighting Engineers (Anon., 2010).

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Bruce-White, C. & Shardlow. M., 2011. A review of the impact of artificial light on invertebrates. *Buglife - The Invertebrate Conservation Trust*, Peterborough UK, 32 pp.

Davies, T. W., Bennie, J. & Gaston, K. J., 2012. Street lighting changes the composition of invertebrate communities. *Biology Letters* **8**: 764-67.

Geffen, K. G. van, Grunsven, R. H. A. van, Ruijven, J. van, Berendse, F. & Veenendaal, E. M., 2014. Artificial light at night causes diapause inhibition and sex specific life history changes in a moth. *Ecology and Evolution* **4**: 2082-89.

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